ABSTRACT OF THE DISCLOSURE

A pattern generation method and system in which hierarchical image data (determining a pattern to be imaged on a target) is received at a graphics engine having a memory, at least one cell determining a repeated feature or set of features of the pattern is stored in the memory, and beam control data is generated in response to the image data. The image data includes residual data including at least two subroutine call commands for each cell stored in the memory. In response to each subroutine call command, the graphics engine retrieves a cell (identified by the command) from the memory, and asserts beam control data that determines a feature or feature set determined by the cell to be imaged at (or beginning at) a location on the target identified by the command. The subroutine call commands can be distributed throughout the image data, including in at least one cell to be cached as well as in the residual data. Preferably, the graphics engine caches each cell of the image data in the memory and generates a set of beam control data in response to each subroutine call command including by retrieving a cached cell from the memory and generating the beam control data in response to the retrieved cell. Alternatively, the graphics engine generates a cell of beam control data in response to each cell of image data, caches each such beam control data cell in the memory, and responds to each subroutine call command of the image data by retrieving a cached beam control data cell from the memory and asserting the retrieved beam control data cell as part of a set of beam control data that determines a feature or feature set (determined by the retrieved cell) to be imaged on the target. Another aspect of the invention is a method and apparatus for determining cells of hierarchical image data (to be transferred to a graphics engine) by analyzing hierarchical raw image data and transforming the raw image data into optimized hierarchical image data including the cells.